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10/773,339	02/09/2004	Ryosuke Kuribayashi	Q77322	6498

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EXAMINER	
MALKOWSKI, KENNETH J	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/773,339	KURIBAYASHI, RYOSUKE
	Examiner	Art Unit
	Kenneth J. Malkowski	2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9,11 and 13-35* is/are rejected.

7)☐ Claim(s) *8,10 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5-7, 11, 17, 19, 25-29, 32 and 34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 5-7, 11, 17 and 19 applicant claims "a proper pulse time width," however it is not clear what the term proper is referring to. Does proper refer to a pulse width with one specific time width in picoseconds, a range of acceptable time widths, or neither? This question is unclear based on the claim language.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-5, 9, 22-23 and 25-27 are rejected under 35 U.S.C. 102(a) as being anticipated by "All-optical Regeneration based on Optical Clock Recovery with Mode-Locked LDs," to Kurita et al., ECOC 1999 PD 3-6

With respect to claims 1 and 22, Kurita et al. discloses an optical signal regenerative repeater comprising: at least one first optical 3R repeater (Figure 4 (caption states the Figure depicts an all-optical 3R regenerator)) which receives an

optical communication signal pulse (Figure 4 (signal entering the 3R regenerator labeled "10 Gb/s optical data"))(Figure 1 (degraded optical data)), and regenerates said optical communication signal pulse (Figure 1 (regenerated optical data)), wherein said first optical 3R repeater comprises a first clock extraction unit (Figure 1 (optical clock extraction))(Figure 4 (1st clock recovery)) which extracts a clock from said optical communication signal pulse and which generates a first optical clock pulse synchronized with said extracted clock (Figure 1 (extracted clock)), and a first optical gate (Figure 1 (optical-gate switching))(figure 4 (1st optical gate SWSA)), which is opened and closed in accordance with a control light corresponding to said optical communication signal pulse (page 1 column 1 paragraph 1 (the optical gate is controlled on and off through optical data pulses)), which receives as a controlled light said first optical clock pulse generated by said first clock extraction unit (Figures 1 and 4 extracted optical pulses are one of two inputs to the optical gate switching module)), and which generates a first regenerated signal pulse corresponding to said optical communication signal pulse (Figures 1 and 4 (regenerated optical data)), and wherein a pulse time width of said control light and said controlled light is different (Figure 2 (the "controlled light", more directly, the extracted clock light is 3 ps while the control light is 17 ps))(page 2 column 1 paragraphs 2-3).

With respect to claims 2 and 23, Kurita et al. discloses the optical signal regenerative repeater according to claim 1, wherein said pulse time width of said controlled light (optical clock) is smaller than said pulse time width of said control light

(Figure 2 (the "controlled light", more directly, the extracted clock light is 3 ps while the control light is 17 ps))(page 2 column 1 paragraphs 2-3).

With respect to claim 4, Kurita et al. discloses the optical signal regenerative repeater according to claim 1, further comprising: a second optical 3R repeater (Figure 4 shows two 3R repeaters in a cascade arrangement)) which receives said first regenerated signal pulse output by said first optical 3R repeater as an intermediate signal light (regenerated 20 Gbps optical data, Figure 4), and regenerates said optical communication signal pulse based on said intermediate signal light (DEMUXED 10 Gbps optical data signal, Figure 4).

With respect to claims 5, 9, 25 and 27, Kurita et al. discloses the optical signal regenerative repeater according to claim 4, wherein said second optical 3R repeater (Figure 4 shows two 3R repeaters in a cascade arrangement)) comprises a second clock extraction unit, which extracts a clock from said intermediate signal light (clock recovery (10 GHz MLLD), Figure 4)) and generates a second optical clock pulse synchronized with said extracted clock (DEMUXED 10 Gbps optical data signal, Figure 4); and a second optical gate (second optical gate (SWSA), Figure 4), which is opened and closed in accordance with said intermediate signal light (page 2 column 2 paragraph 2 (recovery is dominated by the ON/OFF control of the optical gate)), which receives as a controlled light said second optical clock pulse generated by said second clock extraction unit (second of the two control signals entering the second optical gate, Figure 4), and which generates a second regenerated signal pulse corresponding to

said communication signal pulse (DEMUXED 10 Gbps optical data signal output of the second optical gate, Figure 4).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 7,11,15, 17,19, 24, 28-29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over "All-optical Regeneration based on Optical Clock Recovery with Mode-Locked LDs," to Kurita et al., ECOC 1999 PD 3-6 in view of "40-Ghz Tunable Optical Pulse Generation from a Highly-Stable External Cavity Mode-locked Semiconductor Laser Module" to Hashimoto et al., OFC March 2002

With respect to claims 3 and 24, Kurita et al. discloses the optical signal regenerative repeater according to claim 1, however fails to disclose wherein said pulse time width of said control light is smaller than said pulse time width of said controlled light (optical clock). Despite this controlling the "controlled light" or more directly, the clock light to increase or decrease the pulse width is well known in the art and is not a patentably distinct limitation. Hashimoto, from the same field of endeavor discloses an optical clock pulse generator with the ability to increase the bandwidth of the optical clock pulse (page 2 column 1 paragraph 1 (optical pulse width may be increased by decreasing the bandwidth of the wavelength tunable filter inside the cavity, the pulse

width may be flexibly adjusted between 2-ps and 10-ps)). Therefore, it would have been obvious to one of ordinary skill in the art to replace the pulse-width increasing MLLD modified optical clock pulse generator as taught by Hashimoto with the second MLLD optical pulse generator as taught by Kurita (Figure 4, labeled clock recovery (10 GHz MLLD))) such that the regenerated 20 Gbps optical data resulting from the first 3R repeater as taught by Kurita has a smaller pulse time width than the pulse time width of said controlled light. The motivation for doing so would have been to save on optical bandwidth (Hashimoto: page 2 column 1 paragraph 1 (we may need to increase the optical pulse width in order to save the optical bandwidth)) and also for flexible optimization of optical communication systems (Hashimoto: page 2 column 1 paragraph 3 (our EC-MLLD has flexible tunability for pulse width which will be very beneficial for optimization of 40-Gbit/s based optical communication systems))(Figure 5A shows the benefits of a tunable pulse width regarding its relationship to various wavelengths)).

With respect to claims 7, Kurita et al. discloses an optical signal regenerative repeater according to claim 5, however fails to disclose a pulse width converter which converts said pulse time width of said second regenerated signal pulse into said proper pulse time width. Despite this, controlling the "controlled light" or more directly, the clock light to increase or decrease the pulse width is well known in the art and is not a patentably distinct limitation. Hashimoto, from the same field of endeavor discloses an optical clock pulse generator with the ability to change the pulse time width of the optical clock pulse (page 2 column 1 paragraph 1 (optical pulse width may be increased by decreasing the bandwidth of the wavelength tunable filter inside the cavity, the pulse

width may be flexibly adjusted between 2-ps and 10-ps)). Therefore, it would have been obvious to one of ordinary skill in the art to use the pulse-width altering MLLD modified optical clock pulse generator as taught by Hashimoto with the second regenerated signal pulse such that the pulse time width of said second optical clock pulse and said pulse time width of said intermediate signal light are substantially the same. The motivation for doing so would have been to save on optical bandwidth (Hashimoto: page 2 column 1 paragraph 1 (we may need to increase the optical pulse width in order to save the optical bandwidth)) and also for flexible optimization of optical communication systems (Hashimoto: page 2 column 1 paragraph 3 (our EC-MLLD has flexible tunability for pulse width which will be very beneficial for optimization of 40-Gbit/s based optical communication systems))(Figure 5A shows the benefits of a tunable pulse width regarding its relationship to various wavelengths)).

With respect to claims 11,15 and 28-29 Kurita et al. discloses the optical signal regenerative repeater according to claim 4, wherein said second optical 3R repeater (Figure 4 shows two 3R regenerators in a cascade arrangement)); and a second optical gate (Figure 4 shows optical-gate at second of two 3R regenerators), which is opened and closed in accordance with said intermediate signal light (page 2 column 2 paragraph 2 (recovery is dominated by the ON/OFF control of the optical gate)) and which generates a second regenerated signal pulse corresponding to said communication signal pulse according to said controlled light received by said second optical gate (DEMUXED 10 Gbps optical data signal output of the second optical gate, Figure 4). However, Kurita fails to disclose a pulse width converter which converts said

first optical clock pulse generated by said first clock extraction unit into a proper pulse time width. Despite this, pulse width conversion is well known in the art and is not a patentably distinct limitation. Hashimoto, from the same field of endeavor discloses an optical generator with the ability to change the pulse time width of the optical clock pulse (page 2 column 1 paragraph 1 (optical pulse width may be increased by decreasing the bandwidth of the wavelength tunable filter inside the cavity, the pulse width may be flexibly adjusted between 2-ps and 10-ps)). Therefore, it would have been obvious to one of ordinary skill in the art to use the pulse width converter as taught by Hashimoto wherein the optical gate receives as a controlled light said first optical clock pulse converted by said pulse width converter. The motivation for doing so would have been to save on optical bandwidth (Hashimoto: page 2 column 1 paragraph 1 (we may need to increase the optical pulse width in order to save the optical bandwidth)) and also for flexible optimization of optical communication systems (Hashimoto: page 2 column 1 paragraph 3 (our EC-MLLD has flexible tunability for pulse width which will be very beneficial for optimization of 40-Gbit/s based optical communication systems))(Figure 5A shows the benefits of a tunable pulse width regarding its relationship to various wavelengths)).

With respect to claims 17 and 34, Kurita et al. discloses the optical signal regenerative repeater according to claim 1, however fails to disclose a pulse width converter. Despite this, pulse width conversion is well known in the art and is not a patentably distinct limitation. Hashimoto, from the same field of endeavor discloses an optical generator with the ability to change the pulse time width of the optical clock pulse

(page 2 column 1 paragraph 1 (optical pulse width may be increased by decreasing the bandwidth of the wavelength tunable filter inside the cavity, the pulse width may be flexibly adjusted between 2-ps and 10-ps)). Therefore, it would have been obvious to one of ordinary skill in the art to use the pulse width converter as taught by Hashimoto wherein the converter converts into a proper pulse time width a pulse time width of said first regenerated signal pulse output by said first optical 3R repeater. The motivation for doing so would have been to save on optical bandwidth (Hashimoto: page 2 column 1 paragraph 1 (we may need to increase the optical pulse width in order to save the optical bandwidth)) and also for flexible optimization of optical communication systems (Hashimoto: page 2 column 1 paragraph 3 (our EC-MLLD has flexible tunability for pulse width which will be very beneficial for optimization of 40-Gbit/s based optical communication systems))(Figure 5A shows the benefits of a tunable pulse width regarding its relationship to various wavelengths)).

With respect to claims 19 and 32, Kurita et al. discloses an optical signal regenerative repeater according to claim 1, however fails to disclose a pulse width converter which converts said pulse time width. Despite this, pulse width conversion is well known in the art and is not a patentably distinct limitation. Hashimoto, from the same field of endeavor discloses an optical clock pulse generator with the ability to change the pulse time width of the optical clock pulse (page 2 column 1 paragraph 1 (optical pulse width may be increased by decreasing the bandwidth of the wavelength tunable filter inside the cavity, the pulse width may be flexibly adjusted between 2-ps and 10-ps)). Therefore, it would have been obvious to one of ordinary skill in the art to

use the pulse-width altering system as taught by Hashimoto to supply said control signal to the first optical gate . The motivation for doing so would have been to save on optical bandwidth (Hashimoto: page 2 column 1 paragraph 1 (we may need to increase the optical pulse width in order to save the optical bandwidth)) and also for flexible optimization of optical communication systems (Hashimoto: page 2 column 1 paragraph 3 (our EC-MLLD has flexible tunability for pulse width which will be very beneficial for optimization of 40-Gbit/s based optical communication systems))(Figure 5A shows the benefits of a tunable pulse width regarding its relationship to various wavelengths)).

7. Claims 13, 16, 18, 20, 30, 31, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over "All-optical Regeneration based on Optical Clock Recovery with Mode-Locked LDs," to Kurita et al., ECOC 1999 PD 3-6 in view of "40-Ghz Tunable Optical Pulse Generation from a Highly-Stable External Cavity Mode-locked Semiconductor Laser Module" to Hashimoto et al., OFC March 2002 and further in view of U.S. Patent Application Publication No. 2002/0080453 to Leuthold et al.

With respect to claims 13 and 30, Kurita et al. in view of Hashimoto discloses the optical signal regenerative repeater according to claim 11, however Kurita et al. in view of Hashimoto fail to disclose a wavelength converter. Despite this, wavelength conversion is extremely well known in the art and cannot be considered a patentably distinct limitation. It is well known that wavelength conversion is advantageous in that it allows for component reduction by allowing a single given component the ability to interact with multiple wavelengths rather than a single given component interacting with a single wavelength. Wavelength conversion also allows for increased sensitivity in

optical communications systems in that different wavelengths experience different deleterious effects. Leuthold, from the same field of endeavor discloses using a wavelength converter for converting the wavelength of an optical clock pulse (page 1 paragraph 11 (wavelength conversion is accomplished such that the clock signal exhibits a new desired wavelength)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a wavelength converter which converts into an arbitrary wavelength a wavelength of said first optical clock pulse generated by said first clock extraction unit into the regenerator disclosed by Kurita et al. in view of Hashimoto for the obvious advantageous reasons as stated above.

With respect to claims 16 and 31, Kurita et al. in view of Hashimoto discloses the optical signal regenerative repeater according to claim 15, however Kurita et al. in view of Hashimoto fail to disclose a wavelength converter. Despite this, wavelength conversion is extremely well known in the art and cannot be considered a patentably distinct limitation. It is well known that wavelength conversion is advantageous in that it allows for component reduction by allowing a single given component the ability to interact with multiple wavelengths rather than a single given component interacting with a single wavelength. Wavelength conversion also allows for increased sensitivity in optical communications systems in that different wavelengths experience different deleterious effects. Leuthold, from the same field of endeavor discloses using a wavelength converter for converting the wavelength of an optical clock pulse (page 1 paragraph 11 (wavelength conversion is accomplished such that the clock signal exhibits a new desired wavelength)). Therefore, it would have been obvious to one of

ordinary skill in the art to implement a wavelength converter which converts into an arbitrary wavelength a wavelength of said first optical clock pulse generated by said first clock extraction unit into the regenerator disclosed by Kurita et al. in view of Hashimoto for the obvious advantageous reasons as stated above.

With respect to claims 18 and 35, Kurita et al. in view of Hashimoto discloses the optical signal regenerative repeater according to claim 17, however Kurita et al. in view of Hashimoto fail to disclose a wavelength converter. Despite this, wavelength conversion is extremely well known in the art and cannot be considered a patentably distinct limitation. It is well known that wavelength conversion is advantageous in that it allows for component reduction by allowing a single given component the ability to interact with multiple wavelengths rather than a single given component interacting with a single wavelength. Wavelength conversion also allows for increased sensitivity in optical communications systems in that different wavelengths experience different deleterious effects. Leuthold, from the same field of endeavor discloses using a wavelength converter for converting the wavelength of an optical clock pulse (page 1 paragraph 11 (wavelength conversion is accomplished such that the clock signal exhibits a new desired wavelength)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a wavelength converter which converts into an arbitrary wavelength a wavelength of said first optical clock pulse generated by said first clock extraction unit into the regenerator disclosed by Kurita et al. in view of Hashimoto for the obvious advantageous reasons as stated above.

With respect to claims 20 and 33, Kurita et al. in view of Hashimoto discloses the optical signal regenerative repeater according to claim 19, however Kurita et al. in view of Hashimoto fail to disclose a wavelength converter. Despite this, wavelength conversion is extremely well known in the art and cannot be considered a patentably distinct limitation. It is well known that wavelength conversion is advantageous in that it allows for component reduction by allowing a single given component the ability to interact with multiple wavelengths rather than a single given component interacting with a single wavelength. Wavelength conversion also allows for increased sensitivity in optical communications systems in that different wavelengths experience different deleterious effects. Leuthold, from the same field of endeavor discloses using a wavelength converter for converting the wavelength of an optical clock pulse (page 1 paragraph 11 (wavelength conversion is accomplished such that the clock signal exhibits a new desired wavelength)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a wavelength converter which converts into an arbitrary wavelength a wavelength of said first optical clock pulse generated by said first clock extraction unit into the regenerator disclosed by Kurita et al. in view of Hashimoto for the obvious advantageous reasons as stated above.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over "All-optical Regeneration based on Optical Clock Recovery with Mode-Locked LDs," to Kurita et al., ECOC 1999 PD 3-6 in view of U.S. Patent Application Publication No. 2002/0080453 to Leuthold et al.

With respect to claim 14, Kurita et al. discloses the optical signal regenerative repeater according to claim 11, however Kurita et al. fails to disclose a wavelength converter. Despite this, wavelength conversion is extremely well known in the art and cannot be considered a patentably distinct limitation. It is well known that wavelength conversion is advantageous in that it allows for component reduction by allowing a single given component the ability to interact with multiple wavelengths rather than a single given component interacting with a single wavelength. Wavelength conversion also allows for increased sensitivity in optical communications systems in that different wavelengths experience different deleterious effects. Leuthold, from the same field of endeavor discloses using a wavelength converter for converting the wavelength of an optical clock pulse (page 1 paragraph 11 (wavelength conversion is accomplished such that the clock signal exhibits a new desired wavelength)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a wavelength converter which converts into an arbitrary wavelength a wavelength of said first optical clock pulse generated by said first clock extraction unit into the regenerator disclosed by Kurita et al. for the obvious advantageous reasons as stated above.

Allowable Subject Matter

9. Claims 8, 10, 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Malkowski whose telephone number is (571) 272-5505. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KJM 2/18/07

DALZID SINGH
PRIMARY EXAMINER
Dalzid Singh